

Tyler D. Doležal (TS/SCI)

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Education

Massachusetts Institute of Technology

July 2024 - Present

Ph.D. in Materials Science and Engineering

Air Force Institute of Technology

October 2020 - March 2022

M.S. in Applied Physics

Arizona State University

August 2014 - December 2016

B.S. in Physics, B.S. in Astrophysics

Experience

United States Air Force, AETC/MIT

July 2024 - Present

Graduate Student

Captain/Major

- Co-advised by Prof. Ju Li and Prof. Rodrigo Freitas
- Research focus is on structural materials for future defense systems. This includes investigating solid-state phase stability and mechanical response through experimental and computational efforts.

United States Air Force, ACC/AFTAC

August 2023 - July 2024

Director of Operations, Reactor Products Program

Captain

- Directed 15-member/\$16M data analysis and evaluations team to produce critical detail reports examining nuclear events of interest to AFTAC mission partners.
- Established and managed the Center's software development pipeline. Delivered software tools and updates that had been stalled for over 5 years due to lack of official instruction.
- Oversaw \$13M R&D effort involving contractor and DOE lab support. This work launched a brand new operational line of effort for AFTAC and solidified us as an organization on the cutting-edge.
- Program lead that launched AFTAC's first-ever annual Mission Summit event hosted in the D.C. area. Our team established a mission relevant narrative for the event and secured an incredible success with over 400 in-person attendees (over 500 including those attending through VTC). The event's success secured an annual renewal from players in the D.C. area and earned myself a coin from the AFTAC Commander.
- Officer in charge of AFTAC's annual technical forum where we host our mission and research and development partners. This is one of the most important annual events as we facilitate and assist in cross-organizational sync-ups to ensure our operational capabilities continue to grow alongside improved technologies in a mission relevant fashion.

United States Air Force, ACC

March 2023 - August 2023

Senior Research Scientist, Project ARC

Captain

- Hand selected by the Air Force Chief Scientist to provide technical leadership at Air Combat Command's Federal Laboratory located at Beale AFB.
- Directed 30-member PhD rapid solutions team focused on the timely development and deployment of in-house curated software packages requested by our customers.
- Mission successes included a \$2.4M modernization of the U2 airframe and several first-ever software developments on a \$30.3M R&D F-35 data fusion effort.

United States Air Force, ACC/AFTAC

March 2022 - March 2023

*Senior Evaluations Officer**Captain*

- Directed 15-member/\$16M data analysis and evaluations team to produce critical detail reports examining nuclear events of interest to AFTAC mission partners.
- Directed 10-member, DoD & DoE, technical development program with a program budget of \$10M. This work established 3x cutting-edge ISR programs.
- Managed a budget of \$710K for the 24th analysis squadron as the squadron resource advisor.
- Helmed the 18-member weekly material's division data analysis meeting focused on the efficient processing and discrimination of global nuclear events. These meetings were foundational to AFTAC's ability of delivering on-time, mission critical, conclusions on global nuclear treaty adherence.
- Directed quarterly meetings with DOE R&D partners; ensured on-target progress towards project milestones—essential for communication between research and end-using organizations.

United States Air Force, AETC/AFIT

July 2020 - March 2022

*Graduate Student**First Lieutenant/Captain*

- Coursework covered applied physics topics, computational methods, and nuclear engineering.
- Research was on material behavior in extreme environments, radiation effects on electronics, and fast-cured organic plastic scintillators. Gained experience with Monte Carlo algorithms, Density Functional Theory calculations, data handling, high performance computing, and experimental methods.
- Led an 8-member effort to manufacture and characterize a first-ever fast-cured neutron detector.
- Led over 25 tutoring sessions to an audience of peers and senior officers.
- Led over 30 Python tutorial sessions to an audience of peers and senior officers.
- Directed the computational research objectives of 4 undergraduate interns over a 3-month duration.

United States Air Force, AFRL/RI

November 2017 - July 2020

*Project Manager & Quantum/RF Research Physicist**Second/First Lieutenant*

- Helmed the stand-up of the first-ever Air Force research program into superconducting qubits. The project team consisted of 3 PhD research scientists, two undergraduate co-ops, and one graduate co-op.
- Managed a project budget of \$1.1M in basic research funds to establish the experimental system for superconducting qubit research.
- Managed \$250K and directed a 5-member test and evaluations team to establish a 24-network radio frequency (RF) interference test bed to simulate adversarial communication jamming. Additionally, delivered a first-ever multi-input/output test platform to increase RF research throughput ten-fold.
- Led 5-member team on project to characterize communication loss through forested areas at 1.773 GHz in support of \$3M DISA-sponsored study into RF capability gaps and solutions in trouble areas.
- Led 3-member research team to investigate the quantum lab's laser transport efficiency. Our findings redefined quantum lab hardware requirements and boosted the ion trapping efficiency.
- Helped create standard operating procedures which improved experimental techniques, methods, and safe practices while working on quantum communication experiments.
- Designed and manufactured a series of control boxes which automated laser fine-tuning procedures. This saved over 700 man-hours per year by eliminating the need to manually tune each laser.

Achievements

United States Air Force, 2024-2027	Graduate School Fellowship at MIT (Full Support)
AF Technical Applications Center, 2023	CGO of the Quarter (4th Quarter)
United States Air Force, 2023	Project ARC Fellowship (#2/156, \$45K)
Air Force Institute of Technology, 2022	Dean's Award for Best Master's Thesis
Air Force Institute of Technology, 2022	Distinguished Graduate ⁺
Air Force Institute of Technology, 2022	Mervin E. Gross Award [*]
Air Force Institute of Technology, 2022	Edwin E. Aldrin, Sr. Award ^{**}
Air Force Institute of Technology, 2021	CGO of the Year (#1/42)
Air Force Institute of Technology, 2021	CGO of the Quarter (3rd Quarter)
Air Force Institute of Technology, 2021	CGO of the Quarter (2nd Quarter)
Air Force Research Laboratory, 2020	Awarded \$125k in basic research funds (PI)
Air Force Research Laboratory, 2019	Awarded \$125k in basic research funds (Co-PI)
Syracuse University, 2018	SU Graduate Student Scholarship (\$6000)
Officer Training School USAF, 2017	Distinguished Graduate (#2/244)
Arizona State University, 2016	Summa Cum Laude
Arizona State University, 2016	BioXFEL summer research scholarship (\$5000)
Arizona State University, 2016	Undergrad Summer Enrichment Award (\$1500)
Arizona State University, 2015-16	Four consecutive semesters of Dean's List

⁺Top 5% of a class of 204 MS/PhD students

^{*}Awarded to the most outstanding graduate student (#1/52)

^{**}Awarded to the graduate student who demonstrated exceptional leadership (#1/52)

Publications

Tyler D. Doležal, Rodrigo Freitas, Ju Li. Segregation and Ordering of Light Interstitials (B, C, H, and N) in Cr-Ni Alloys: Implications for Grain Boundary Stability in Superalloy Design, *Journal Name* **2025**, Under Review.

Tyler D. Doležal, Emre Tekoglu, Jong-Soo Bae, Gi-Dong Sim, Rodrigo Freitas, Ju Li. Atomistic Simulations of Short-range Ordering with Light Interstitials in Inconel Superalloys, *Computational Materials Science* **2025**, 253, 113858. DOI: <https://doi.org/10.1016/j.commatsci.2025.113858>.

Emre Tekoglu, Jong-Soo Bae, Ho-A Kim, Kwang-Hyeok Lim, Jian Liu, **Tyler D. Doležal**, Mohammed A. Alrizqi, Aubrey Penn, Wen Chen, A. John Hart, Joo-Hee Kang, Chang-Seok Oh, Jiwon Park, Fan Sun, Sangtae Kim, Gi-Dong Sim, Ju Li. Superior high-temperature mechanical properties and microstructural features of LPBF-printed In625-based metal matrix composites, *Materials Today* **2024**, 80, 297-307. DOI: <https://doi.org/10.1016/j.mattod.2024.09.006>

Tyler D. Doležal, Nick A. Valverde, Jodie A. Yuwono and Ryan A. Kemnitz. Mo-Re-W Alloys for High Temperature Applications: Phase Stability, Elasticity, and Thermal Property Insights via Multi-Cell Monte Carlo and Machine Learning, *Materials & Design* **2024**, 22, 113226. DOI: <https://doi.org/10.1016/j.matdes.2024.113226>

Jodie A. Yuwono, Xinyu Li, **Tyler D. Doležal**, Adib J. Samin, Javen Qinfeng Shi, Zhipeng Li, and Nick Birbilis. A computational approach for mapping electrochemical activity of multi-principal element alloys, *npj Materials Degradation* **2023**, 87(7). DOI: <https://doi.org/10.1038/s41529-023-00409-7>.

Tyler D. Doležal, Juan J. Manfredi, and Brian G. Frandsen et al. Manufacturing and characterization of a boron-loaded fast-cured plastic organic scintillator, *Nuclear Instruments and Methods in Physics Research Section A* **2023**, 1056, 168602. DOI: <https://doi-org.afeit.idm.oclc.org/10.1016/j.nima.2023.168602>.

Tyler D. Doležal and Adib J. Samin. A first-principles study on the early-stage corrosion of a NiWNb alloy in a chloride salt environment, *Journal of Nuclear Materials* **2023**, 582, 154457. DOI: 10.1016/j.jnucmat.2023.154457.

Tyler D. Doležal and Adib J. Samin. Adsorption of Oxygen to High Entropy Alloy Surfaces for up to 2 ML Coverage Using Density Functional Theory and Monte Carlo Calculations, *Langmuir* **2022**, 38(10), 3158-3169. DOI: 10.1021/acs.langmuir.1c03191.

Tyler D. Doležal. A study on the early stages of degradation of multi-component alloy surfaces in extreme environments using the multi-cell Monte Carlo method, *Air Force Institute of Technology* **2022**, *Master's Thesis*, <https://scholar.afit.edu/physics/>.

Peer Review Experience

Institute of Physics (IOP) Trusted Reviewer Certificate, **Feb 2024**

Reviewer, *IOP: Nuclear Fusion* **March 2025**.

Reviewer, *IOP: Physica Scripta* **March 2024**.

Reviewer, *IOP: Materials Research Express* **January 2024**.

Reviewer, *ACS: Applied Materials and Interfaces* **July 2023**.

Reviewer, *Electrochimica Acta* **May 2023**.